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THE FIRST RECORD OF *AMETROPUS FRAGILIS* ALBARDA, 1878 (INSECTA: EPHEMEROPTERA) FROM CROATIA

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In the Drava River near Donji Miholjac in January 2014 the species *Ametropus fragilis* Albarda, 1878 was recorded for the first time in Croatia.

Key words: Ephemeroptera, *Ametropus fragilis*, The Drava River, Croatia

Čuk, R., Čmrlec, K. & Belfiore, C.: Prvi nalaz vodencvijeta *Ametropus fragilis* Albarda, 1878 (Insecta: Ephemeroptera) u Hrvatskoj. *Nat. Croat.*, Vol. 24, No. 1, 151–157, 2015, Zagreb.

U rijeci Dravi kod Donjeg Miholjca u siječnju 2014. godine po prvi puta je na području Republike Hrvatske utvrđena vrsta *Ametropus fragilis* Albarda, 1878.

Key words: Ephemeroptera, *Ametropus fragilis*, rijeka Drava, Hrvatska

INTRODUCTION

Mayflies (Ephemeroptera) are a very old order of insects, dating from the Carboniferous (FENTON & FENTON, 1989). Many mayfly species are sensitive to environmental perturbations and pollution so they are recognized as good bioindicators of water quality (SLÁDEČEK, 1973; SOWA, 1980; ROSENBERG & RESH, 1993). They are a critical component in freshwater ecosystems due to their diversity, abundance and their role in nutrient cycles (MOOG, 2002). They are cosmopolites and in lotic environments contribute up to 25% of the total production of zoobenthos in temperate Europe (ELLIOT *et al.*, 1988). Their life cycle includes a number of moults (instars) before they emerge as adults. Mayflies are unique among insects because their winged subadult (subimago) goes through an additional moult before it becomes an imago (BRITAIN & SARTORI, 2003). Their body shape varies according to habitat.

Taxonomic knowledge of Ephemeroptera of the world has grown very much during the last decades, especially if we consider that the first comprehensive monograph was published more than 120 years ago by EATON (1883–1888). Currently more than 3,045 species (405 genera and 42 families) of extant mayflies are recognized (BRITAIN & SARTORI, 2003; BARBER-JAMES *et al.*, 2008). There are, however, still considerable gaps in our knowledge about the taxonomy, distribution and ecology of European mayfly taxa. More than 342 nominal species (approximately 18 families and 50 genera, depending on taxo-

onomic view) are recorded throughout Europe (BUFFAGNI *et al.*, 2007; BAUERNFEIND & SOLDÁN, 2012). New species are still found in Europe (especially in the Mediterranean and the Balkans).

Unfortunately, the Croatian mayfly fauna is poorly investigated and no check-list exists, every new record therefore representing an interesting contribution. Thirty-five species have been cited for Croatia (BUFFAGNI *et al.*, 2007), although VILENICA *et al.* (2014) announced 62 species.

This paper presents the first finding of the mayfly *Ametropus fragilis* Albarda, 1878 in Croatia.

MATERIAL AND METHODS

Research area

The total length of the Drava River is 749 km with an associated watershed area of 41,238 km² (NARODNE NOVINE, 91/08). The river is situated in two ecoregions: the Alps (ER 4) and the Pannonian ecoregion (ER 11) (ILLIES, 1978). The spring is in South Tyrol in Italy (near Lake Dobbiaco), the river continuing through Austria and Slovenia where its upper reaches are used for electricity production. Further downstream it forms most of the border between Croatia and Hungary, then heading back into Croatia again it meets the Danube near the Croatian-Serbian border (near the city of Aljmaš) (Fig. 1).



Fig. 1. A map of Croatia with a detail of the studied area



Fig. 2. The Drava River near Donji Miholjac

The length of the Drava River in Croatia is 323 km, a stretch of 136 km forming the Croatian-Hungarian border) (NARODNE NOVINE, 91/08). In the middle reach, when the river enters Croatia, the Drava River is modified by three large hydropower dams (Varaždin, Čakovec and Dubrava) but parts of the lower reaches are near natural (TOMAS *et al.*, 2013).

According to Croatian typology, the Drava River is divided into two types. The middle reach (from Slovenian-Croatian border down to Terezino Polje) is classified among "Very large lowland rivers – lower course of the Mura River and middle course of the Sava and Drava Rivers" while the lower reach belongs among "Very large lowland rivers – lower course of the Sava and Drava Rivers" (including the studied location near Donji Miholjac) (NARODNE NOVINE, 73/13).

The dominant substrates at the studied location were psammal (sand) and argyllal (mud) with fragments of xylal (large logs/dead wood) (HRN EN 16150) (Fig. 2).

Sampling and laboratory methods

A sample of macrozoobenthos was collected by using a hand net with a mesh size of 500 μm according to the AQEM sampling method (HERING *et al.*, 2004). All microhabitats represented with a coverage of more than 5% were sampled. The collected material was preserved with ethanol in the field and finally stored in ethanol (96%). Determination of benthic macroinvertebrates was conducted in the laboratory with the use of a binocular stereomicroscope (Olympus SZX9). Specimens of all individual taxa were deposited in the collection of mayflies in the Central Water Management Laboratory of Hrvatske vode.

RESULTS AND DISCUSSION

One specimen of *A. fragilis* in larval stage was found in the Drava River near Donji Miholjac in January 2014. The morphology of the larva is unique and cannot be misin-

terpreted. Body length is 12 mm. Overall colouration is light brownish, abdomen along the mediolongitudinal line with reddish brown triangular spots (Fig. 3a). Maxillary and labial palps are three-segmented, glossae and paraglossae with long bristles. Forelegs are short with curved claws and characteristic ventral process on coxae (Fig. 3b). The middle and hind legs are long with short tibia and a very long tarsal claw. Seven pairs

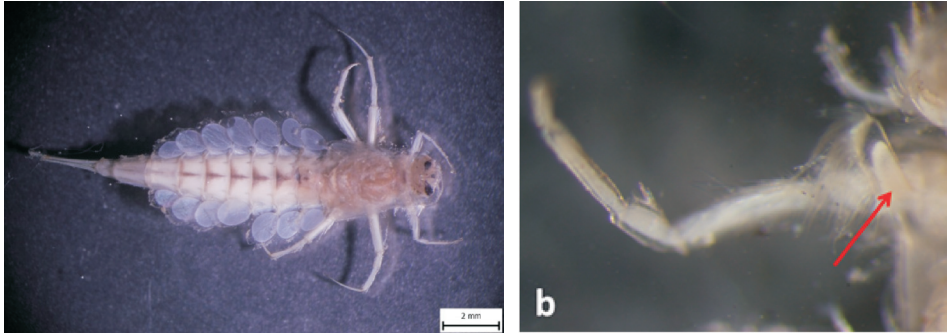


Fig. 3. *Ametropus fragilis* Albarda, 1878, larva. a) dorsal view; b) ventral process at the base of fore leg (red arrow)

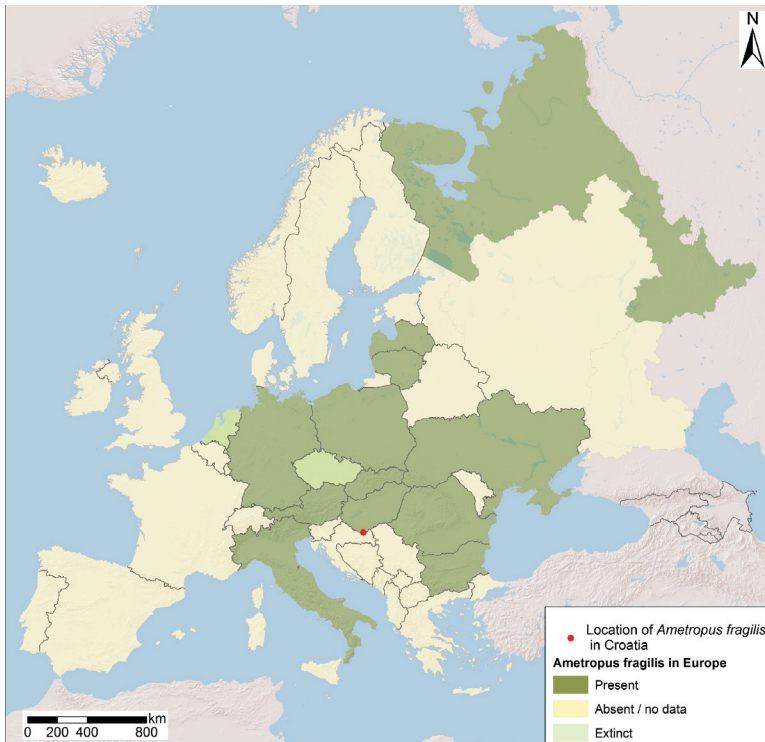


Fig. 4. Distribution of mayfly *A. fragilis* in Europe (darkgreen) with the location of the first record in Croatia (red spot)

of single, lateral plate-like gills with a margin that has long setae. Caudal filaments are unicoloured with long dense setae along internal and external margin.

Family Ametropodidae (with *A. fragilis* as the only Palearctic species) belongs to the superfamily Baetoidea. Since BRODSKIJ (1930) described *A. eatoni* its identity remained doubtful until LANDA (1969) proposed a synonymy between *A. fragilis* and *A. eatoni*, tentatively confirmed by MOL (1984) after a study on the lectotype of *A. fragilis*. However, according to KLUGE (2004) the identity of *A. eatoni* is still doubtful.

The distribution of *A. fragilis* covers Central and Eastern Europe, Siberia (sub. *A. eatoni*), North-Western Canada and USA. European findings include Germany, Italy, Poland, Austria, Slovakia, Hungary, Bulgaria, Romania, Estonia, Latvia and Lithuania (THOMAS & BELFIORE, 2013) (Fig. 4). The species is considered extinct in The Netherlands (MOL, 1985) and the Czech Republic (SOLDÁN & ZAHŘÁDKOVÁ, 2000; FARKAČ *et al.*, 2005). First records in Italy (1997) could be a result of human activity, linked to fish restocking in rivers (TURIN *et al.*, 1997). According to the available data *A. fragilis* has not been recorded in Croatia so far (BUFFAGNI *et al.*, 2007; THOMAS & BELFIORE, 2013). Although there are findings on the Hungarian side of the Drava River (HORVAI *et al.*, 2012), this record on the Croatian side is the first, even if it was expected.

Larvae are psammophilous (sand dwelling) and usually remain hidden in the muddy or sandy substratum (semi-burrowers). Imagines occur in April and May. Preferred microhabitats include submerged logs and accumulations of dead leaves (JAZDZEWSKA, 1973). Loss of habitat and increasing pollution represent a great threat to this species.

Values of the 50% percentile (the year of 2013) of the most investigated physico-chemical parameters at the investigated location at Donji Miholjac (COD-Mn = 2.8 mgO₂/l; BOD₅ = 1.8 mgO₂/l; ammonium = 0.0305 mgN/l; total nitrogen = 1.365 mgN/l; total phosphorous = 0.0595 mgP/l; nitrates = 1.12 mgN/l) indicate good water status while orthophosphates (0.018 mgP/l) and pH (8.1) indicate high water status (NARODNE NOVINE, 73/13).

Benthic macroinvertebrate taxa found together with *A. fragilis* at the location investigated were *Corophium curvispinum* Sars, 1895, *Dikerogammarus villosus* (Sowinski, 1894) *Dikerogammarus* sp., *Gammarus roeseli* Gervais, 1835, *Micronecta* sp., *Simulium* sp., Chironomini Gen. sp., Orthoclaadiinae Gen. sp., Tanypodinae Gen. sp., Oligochaeta Gen. sp., *Baetis tracheatus* Keffermüller & Machel, 1967, *Siphonurus* sp., *Leuctra* sp., *Viviparus aeneus* (Bourguignat, 1862), *Stagnicola* sp., *Corbicula* sp. and *Hydropsyche* sp.

The Saprobic index (PANTLE & BUCK, 1955) based on benthic macroinvertebrates was calculated according to the saprobic indicator taxa list (MIHALJEVIĆ *et al.*, 2011) and later modified (Mihaljević, personal communication, November 15, 2014). Saprobic index value of 2,12 at the location investigated indicates good water status.

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SAŽETAK

Prvi nalaz vodencvijeta *Ametropus fragilis* Albarda 1878 (Insecta: Ephemeroptera) u Hrvatskoj

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Vodencvijetovi (Ephemeroptera) su red kukaca koji se zadržavaju uz vode, dok ličinke žive u vodi. Mnoge su vrste osjetljive na različita zagađenja pa su dobar indikator kakvoće voda. Fauna vodencvijetova u Hrvatskoj je slabo istražena i check-lista još uvijek ne postoji.

U rijeci Dravi kod Donjeg Miholjca u siječnju 2014. godine prvi put je na području Republike Hrvatske zabilježena vrsta *Ametropus fragilis* Albarda, 1878 iz porodice Ametropodidae. Vrsta je utvrđena na temelju prikupljene ličinke.